

Contributions from the Department of Biology, University of Western Australia. No. 2.

Neoniphargus obrieni, a New Species of Blind Amphipod from Victoria, by **George E. Nicholls**, D.Sc., F.L.S., Professor of Biology, University of Western Australia.

(Read June 8, 1926. Published July 6, 1926.)

During a short visit to Melbourne, in February of this year, I was able to spend a week-end at Mt. Buffalo. Collecting trips were made to all parts of the plateau, and in practically every place, where water stood in shallow pools or flowed in reedy runnels, specimens of *Phreatoicus* were found abundantly. As, so far as I can discover, *Phreatoicus* has not been recorded from this locality and as the specimens seemed to differ in some particulars from *P. australis*, I collected a large number from different parts of the plateau for more careful examination.

From my experience in collecting *Phreatoicus* in Western Australia, as well as from Geoffrey Smith's account of collecting in Tasmania, I looked to find some specimens of *Neoniphargus* associated with the isopod and was surprised at its apparent absence. Finally, on the last day of my stay, tracing *Phreatoicus* up a creek, I came upon a small spring discharging into a sphagnum bog, at an altitude of about 4,800 feet; here, by removing a quantity of the bog-moss, I cleared a small space, to the depth of a couple of feet or so, and from the exposed water and the decaying moss at the bottom of the cavity secured more than two dozen small pink Amphipods. Several were evidently mature females with obvious brood-pouch. With but a pocket lens, it was not possible to identify these positively as *Neoniphargus*, but their practically eyeless condition (a tiny spot of white pigment alone remaining of these organs) marked them as almost certainly new, the only other blind Amphipods, known to me from Eastern Australia, being *Gammarus haasei*, which is a much larger form, and *Niphargus pulchellus*, readily to be recognised by its long third uropod.

The taking of a Gammarid at this height seems to constitute a record for this group in Australia, *Gammarus barringtonensis* being taken in N.S.W. at an altitude a few hundred feet less. That, also, was accompanied by a species of *Phreatoicus* (*P.*

shephardi) and, alongside, were found two terrestrial forms, *Talitrus sylvaticus* and *Cubaris helmsianus*. On the Mt. Buffalo Plateau, under logs and leaves, I took a few *Talitrus* (probably *T. sylvaticus*) and an Oniscid, not yet identified. Both species of *Phreatoicus* described from Eastern Australia have been taken at comparable and even greater heights.

The Victorian specimens of *Neoniphargus spenceri*, first received by Sayce, seem to have been taken from a precisely similar situation, though at a much lower altitude, yet these retained well-developed eyes. From Tasmania a number of species of *Neoniphargus* have been recorded by Thomson and Geoffrey Smith, but apparently all of these occur in open water and none are blind.

It is probable, therefore, that *N. spenceri* normally lives for a considerable part of the year in open water, while the Mt. Buffalo form has become permanently adapted to a life in darkness. It seems not to occur in Lake Catani (into which the bog drains), nor in the New Reservoir, both of which have been made practically permanent and comparatively deep in recent years by the construction of a dam near the original outlet. Apart from these two small lakes, there seems to be on the Plateau no standing water. The lesser creeks and runnels would be likely to freeze solidly during the quite severe and prolonged winter season, while the many shallow swamps would also be liable to become completely dry.* Only in the sheltered waters beneath the surface of the bog would these Amphipods be likely to survive upon the Plateau in a retreat secure from both freezing and dessication. Except for these two Crustaceans and a few insect larvae, the waters of this area seemed devoid of life at the time of my visit.

In size, *Neoniphargus obrieni* is smaller than any species of its genus described hitherto, my largest specimen barely exceeding 5 mm. As a further adaptation, probably, to life in these sunless peaty waters, there are a number of accessory branchiae. It is highly probable that the water beneath a foot or so of moss (much of it dead), would be but comparatively poorly oxygenated. It is

* The *Phreatoicus* sp. which occurs abundantly and widespread over the Plateau, seems much more able to survive a considerable degree of dessication. A large number of specimens were taken on one occasion (Feb. 14th) curled up on the surface of some rapidly drying mud, beneath a piece of bark. Some of these were taken, with the underlying mud, and kept without water, in a small wooden box, till my return to Perth on March 4th. Placed in water, they promptly unrolled and continued to lead an active existence in the laboratory for several weeks, when they all died during the prevalence of a short spell of hot weather. I have similarly taken *P. lintoni* and *P. palustris* curled up in practically dry mud.

interesting to note that somewhat similar structures occur in the Western Australian form, *Neoniphargus branchialis*, which is frequently taken in the waters of peaty swamps and in shallow lakes, the muddy floors of which are heavily loaded with decomposing organic matter.

The species is named in compliment to Mr. F. G. O'Brien, who was my companion in the long tramps over the Plateau.

***Neoniphargus obrieni* sp. nov.**

In general appearance somewhat closely resembling *N. fultoni* Sayce, it has a rather more slender build, particularly in the pleon, where the segments are unusually shallow.

Cephalon equals in length the first two pereon segments. The side-plates are rounded, the first narrow and not so deep as its segment; side-plates 2 and 3 equal in width and deeper than their respective segments; side-plate 4 emarginate, distinctly deeper than its related segment, but scarcely as wide as side-plates 1 and 2 combined. Upon the ventral border of side-plates 1—4 there is a single seta anteriorly and a group of three or four setae posteriorly.

Pleon segments 1—3 with inferior margin rounded, postero-lateral corners angular, the second being prolonged into an acute projection; posterior margin of the second, sinuous, of the third, notched. A pair of somewhat widely separated setae dorsally on the posterior margin of the second pleon segment; near the anterior corner of the inferior margin of the pleon segments are a couple of stout setae, notched sub-apically and set with a cilium. (In a male specimen examined, there were three of the setae on the second pleon segment.) Last segment with stout spinule on either side of the base of the telson, but none on penultimate segment.

Telson, slightly longer than broad, cleft for two-thirds of its length.

Eyes vestigial, not to be distinguished in spirit specimens. Antenna 1 about two-fifths of the length of the body; peduncle with first joint once and a half the length of the second, which is once and a half the length of the terminal joint; flagellum 14-jointed, more than once and a half the length of the peduncle, with olfactory cylinders upon all the articuli from the sixth onwards; accessory flagellum 2-jointed, barely as long as the two proximal joints of the primary flagellum. Antenna 2 barely two-thirds the length of Antenna 1, with prominent antennular cone, terminal joint of peduncle little shorter than preceding joint; flagellum 7-jointed, scarcely equalling the combined length of the two distal joints of peduncle. Olfactory cylinders on joints 3, 4, 5, and 6 in the male, absent in the female.

Mandibles closely resembling those of *N. spenceri*, but with fewer spines in spine-row; mandibular palp with second joint once and a half the length of the third. First maxillae with palp differing on the two sides (with six spines and a simple seta apically on the left and with six or seven simple setae on the apex of opposite palp); the inner plate with the usual two plumose setae and fringed along both inner and outer margins with very numerous fine setae. Second maxilla much as in *N. spenceri*, but with the short external spinule on the apex of outer plate, represented by a long plumose seta; mesial margin of inner plate set with a series of eight small tufts of setae.

Gnathopods 1 and 2 nearly similar and of equal size, the fifth joint produced into an obtuse lobe and widened distally to form the typical sub-triangular (cup-shaped) joint to support the almost quadrate propod; palm convex and slightly oblique in gnathopod 1, straight in gnathopod 2.

Gnathopod 2 bears a small accessory branchia; on pereopods 1 and 4 the accessory branchia appears as a large branched structure.

Uropods 1 and 2 extending backwardly to the level of the end of the telson; uropod 3 elongated, inner ramus small with single apical seta, outer ramus with minute second joint, surrounded by a crown of setae. These setae, as, also, those arming the apex of the telson, are notched sub-apically and bear a slender cilium.

Length.—5 mm.

Colour.—In life, a delicate pink, translucent; in spirit, a pale yellowish-brown, with, in some, a streak of darker brown along dorsal line.

Habitat.—Taken in February of this year, associated with *Phreatoicus* sp., beneath the surface of a bogmoss, at the head of a creek draining into Lake Catani, Mt. Buffalo. Altitude about 4,800 ft. Twenty-eight specimens, several of which were adult females.

Remarks.—While possessing certain distinctive characters, *N. obrieni* seems, in respect to very many of its features, to occupy a position intermediate between *N. spenceri* and *N. fultoni*, the only representatives of the genus described, hitherto, as occurring in the eastern part of the Australian mainland.

It is smaller and more slender even than the tiny *N. fultoni* and is peculiar in its eyeless condition and in the shortness of its first antennae. In the occurrence of olfactory cylinders (Pl. IX., Fig. 1) on both antennae in the male, it resembles *N. fultoni*, although these organs are apparently much more numerous in the blind form. The existence of these structures in *N. spenceri* is not

recorded nor does Sayce state whether they are to be found in the female of *N. fultoni*. The second antennae (Pl. IX., Fig. 2) are much as in *N. fultoni*.

In the condition of the mouth parts, *N. obrieni* agree quite closely with *N. spenceri*; no account of these structures is included in Sayce's description of *N. fultoni* (1902, p. 57).

The upper lip (Text, fig. 1) is rather more rounded, practically semi-circular in shape, with a dense ventral tuft of setae. The description of the mandibles in *N. spenceri* (Sayce, 1900, p. 240) would serve, with but little modification, for this species (Text, figs. 2, 2a), the spines in the spine-row being fewer (four on the left side, two on the right) and the terminal joint of the palp better armed with setae, but not broadened.

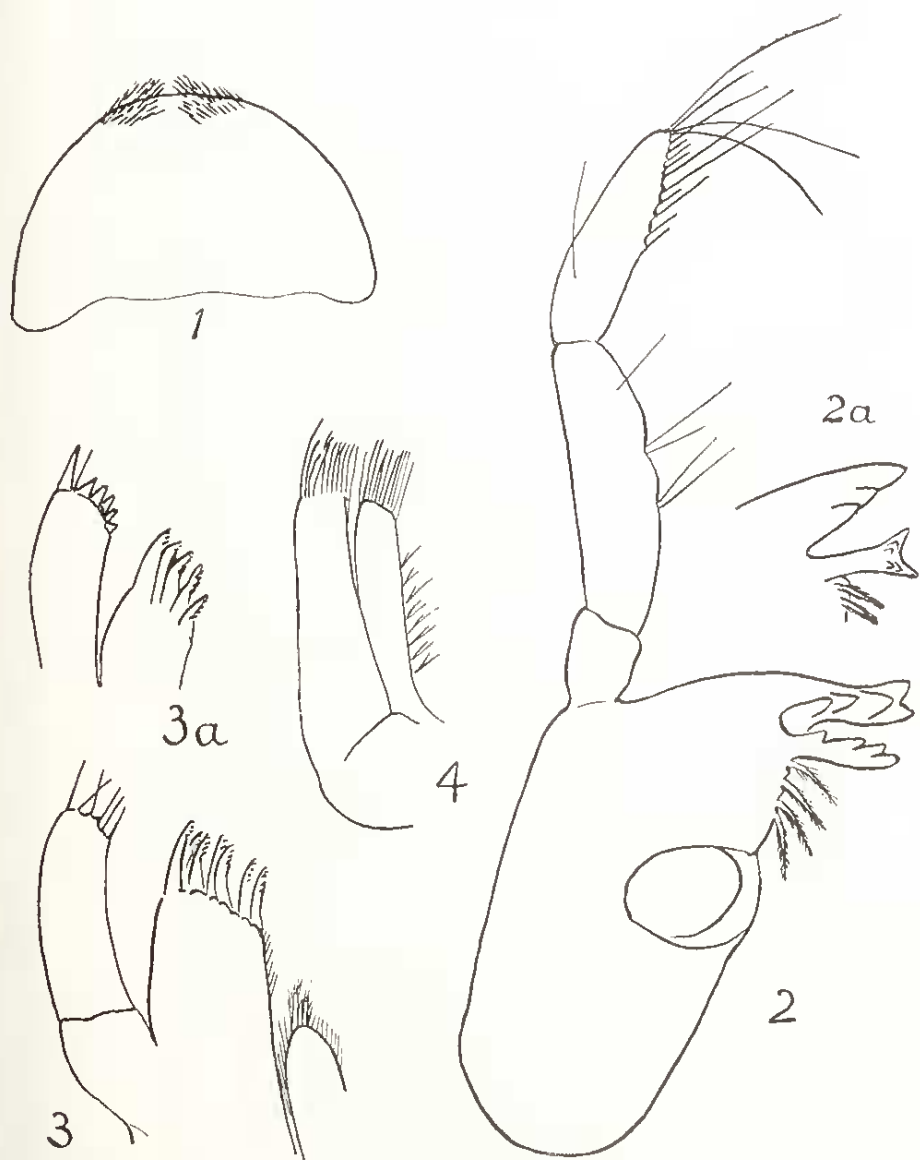


FIG. 1.—*Neoniphargus obrieni*.—1, upper lip; 2, left mandible; 2a, cutting edges of right mandible; 3, first maxilla; 3a, part of first maxilla of opposite side; 4, second maxilla.

In the first maxillae (Text, fig. 3, 3a), too, there is a marked agreement between the two species, the inner lobe in *N. obrieni* being, however, slightly more rounded with the setose fringe extending along both inner and outer margins and the apical plumose setae shorter. A similar difference between the palp of opposite sides occurs in both species. In the second maxillae (Text, fig. 4) the only points of difference observed are that the external spinule on the outer plate of this appendage in *N. spenceri* is replaced in *N. obrieni* by a long plumose seta and that the fringe of setae along the mesial margin of the inner plate in the former is broken up in the latter into a series of small tufts.

The maxillipedes (Pl. IX., Fig. 3 and Text, fig. 2) show the inner and outer plates as a little longer, relatively to the palp, than appears, from Sayce's figure, to be the case in *N. spenceri*. Upon the inner plate, plumose setae are fewer and the apex is more



FIG. 2.—*Neoniphargus obrieni*.—Distal portion of inner and outer plates of maxillipedes.

rounded; the outer plate has the series of spine-teeth extended proximally by long stout spines; the fringing setae on the inner margin of the second joint of the palp appear distinctly longer, the third joint of the palp relatively shorter and stouter than in *N. spenceri*. Each of the tufts of setae, springing from the outer distal end of the joints of the palp, is represented in *N. obrieni* by but a single seta.

The side plates of the gnathopoda are well rounded, the anterior considerably the smaller; the gnathopoda (Pl. IX., Figs. 4, 5) are much alike excepting for a slight difference in the shape of the 6th joint and a consequent alteration in the slope of the palm. The basos, too, of the second gnathopod is rather longer than the corresponding joint in the preceding limb.

The pereopods (Pl. IX., Fig. 6) do not differ noticeably from those of *N. fulltoni* excepting, perhaps, that they are a trifle shorter relatively. The grouping of the setae on the inferior margin of the side-plates 1—4 is closely paralleled in the side-plates 1 and 2 of *N. fulltoni* (fide Sayce's figures, 1902, Pl. VII., Gn.¹ and Gn.²), but these setae are not shown in the figure of the fourth side-plate (op. cit., Pl. VIII., pr. 2). In *N. spenceri*, these setae are shown as much more numerous, but still separable into two groups (1900, Pl. XL., Fig. Gn.²). In *N. thomsoni* they appear to form a continuous fringe (Thomson, 1893, Pl. VI., Fig. 8). while in the Western Australian form, *N. branchialis* (1924, Pl. XI., p. 1), these setae have undergone a decrease in number, the two groups of setae being represented by but one and two setae respectively.

The occurrence, on the dactyl of the pereopoda, of a single plumose seta may be a character of generic value. It certainly occurs in all of the undoubted species of *Neoniphargus* which I have been able to examine and is figured by Sayce, for *N. fulltoni*, but without mention in the text. It does not appear, however, in that author's figures of *N. spenceri*.

Accessory branchiae (Pl. IX., Figs. 6, 7) related to certain of the pereopods, seem to be peculiar to *N. obrieni*, among Eastern Australian forms, nor does Geoffrey Smith refer to such structures as present in Tasmanian species. Their branched condition on two, at least, of the pereopods is paralleled in *N. branchialis* (1924, Pl. X., Fig. Gn.2 and Pl. XI., Figs. P.1 and P.3).

The pleon is much less deep, than in either of the species described by Sayce; the ventral margin of each of the three segments is armed with two setules each with a sub-apical notch bearing a cilium;† in *N. fulltoni* there is but one well developed spinelet in this position and in *N. spenceri* this is absent, apparently. The urosome is, however, less spinulose than in *N. fulltoni*.

The third uropod (Pl. IX., Figs. 8, 9, and 9a) has the outer ramus unusually short and less spinulose than in *N. spenceri*, and

† This type of seta is said to characterise members of the genus *Crangonyx*. It is also present, as I have pointed out (1926), in a blind Western Australian form, *Protocrangonyx*, intermediate in character between *Crangonyx* and *Neoniphargus*.

lacks, also, the plumose setae of *N. fulltoni*. The terminal joint is extremely minute. The inner ramus, however, is relatively larger and with but a single apical spine, in place of three in *N. spenceri* or the two plumose setae of *N. fulltoni*. On the whole, in the condition of this uropod, this species agrees rather more closely with *N. thomsoni* than with either of the two eastern mainland forms.

The telson resembles, in shape, that of *N. fulltoni*, being distinctly longer than broad. In *N. spenceri* the breadth equals the length, while in *N. thomsoni* the breadth is considerably greater than the length. In the two latter, the cleft is roughly half the length; in *N. fulltoni* and *N. obrieni* the cleft is deeper and the two portions narrower, but the apical cluster of three spines in *N. spenceri*, *N. thomsoni* and *N. obrieni* is reduced to two in *N. fulltoni*.

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EXPLANATION OF PLATE IX.

All figures are of *Neoniphargus obrieni* (female).

- Fig. 1. First Antenna.
 2. Second Antenna.
 3. Maxilliped.
 4. Side-plate 1 and first Gnathopod.
 5. Side-plate 2 and second Gnathopod, with marsupial plate and primary branchia.
 6. Side-plate 3, first peraeopod, marsupial plate, primary and branched accessory branchia.
 7. Side-plate 6, base of fourth peraeopod, simple primary and branched accessory branchia.
 8. Urns, uropods 1—3 and telson, in lateral view.
 9. Third uropod, inner view.
 9a. Apex of third uropod, more highly magnified.
 10. Telson, in dorsal view.

br, branchia; br¹, accessory branchia; c, olfactory cylinders;
 m, marsupial plate.

